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STI for the Transformation to Sustainability: Roadmaps for SDGs

TWI2050
The World in 2050
www.twi2050.org

Nebojsa Nakicenovic
Deputy Director General
International Institute for Applied Systems Analysis
Professor Emeritus of Energy Economics
Vienna University of Technology

Expert Group Meeting on Science, Technology and Innovation,
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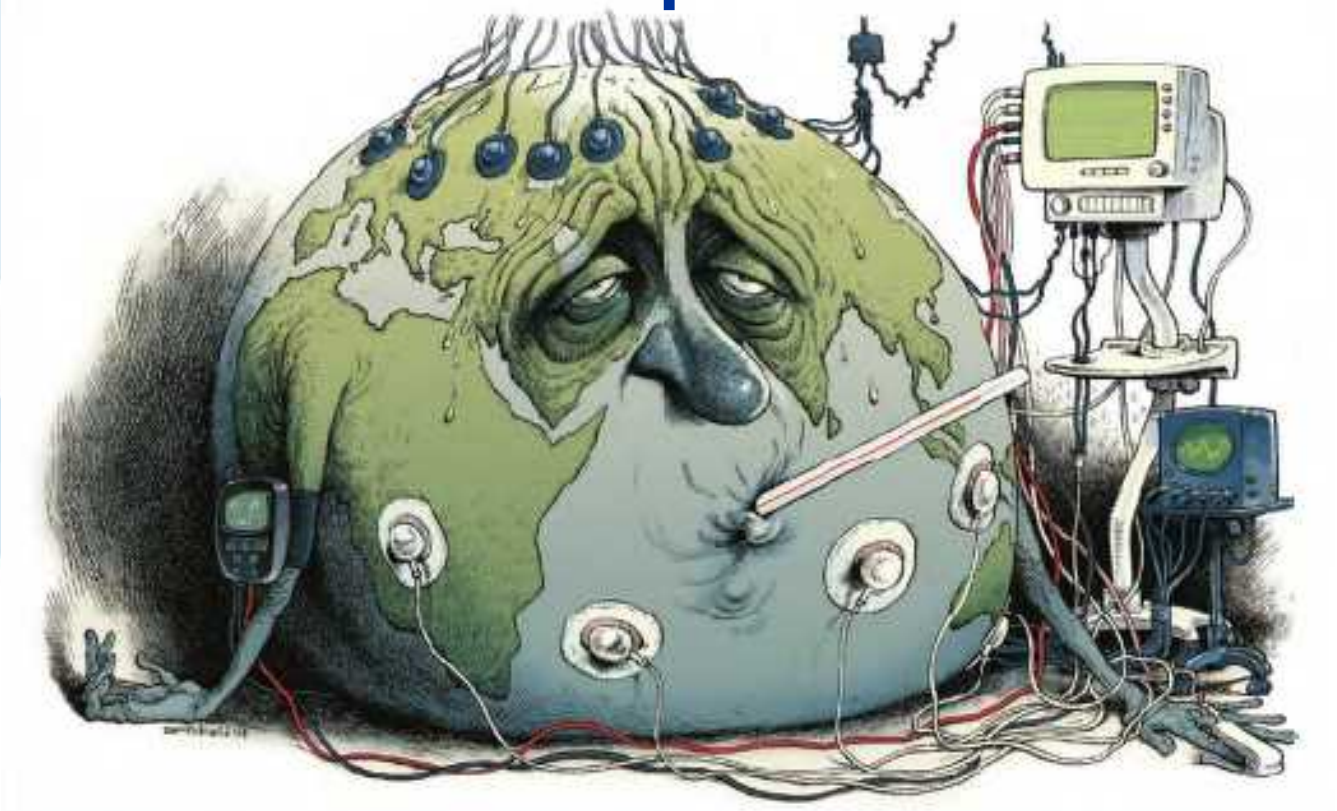
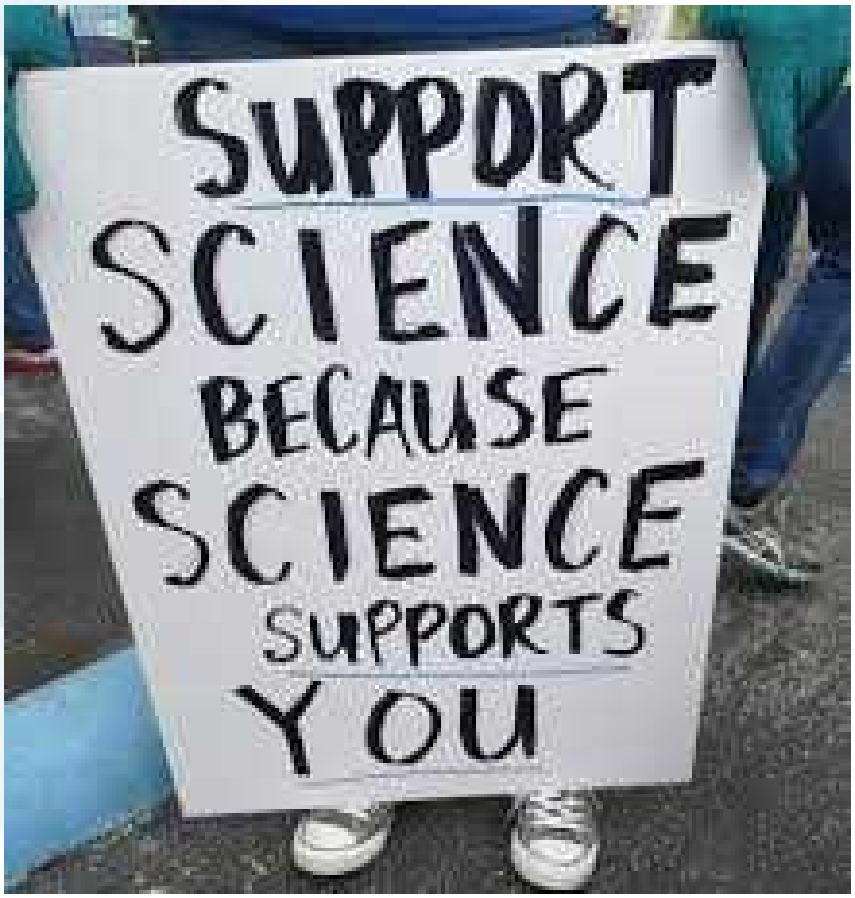
IIASA, International Institute for Applied Systems Analysis

The Natomo Family, Kouakourou, Mali

Collective Responsibility in the Anthropocene

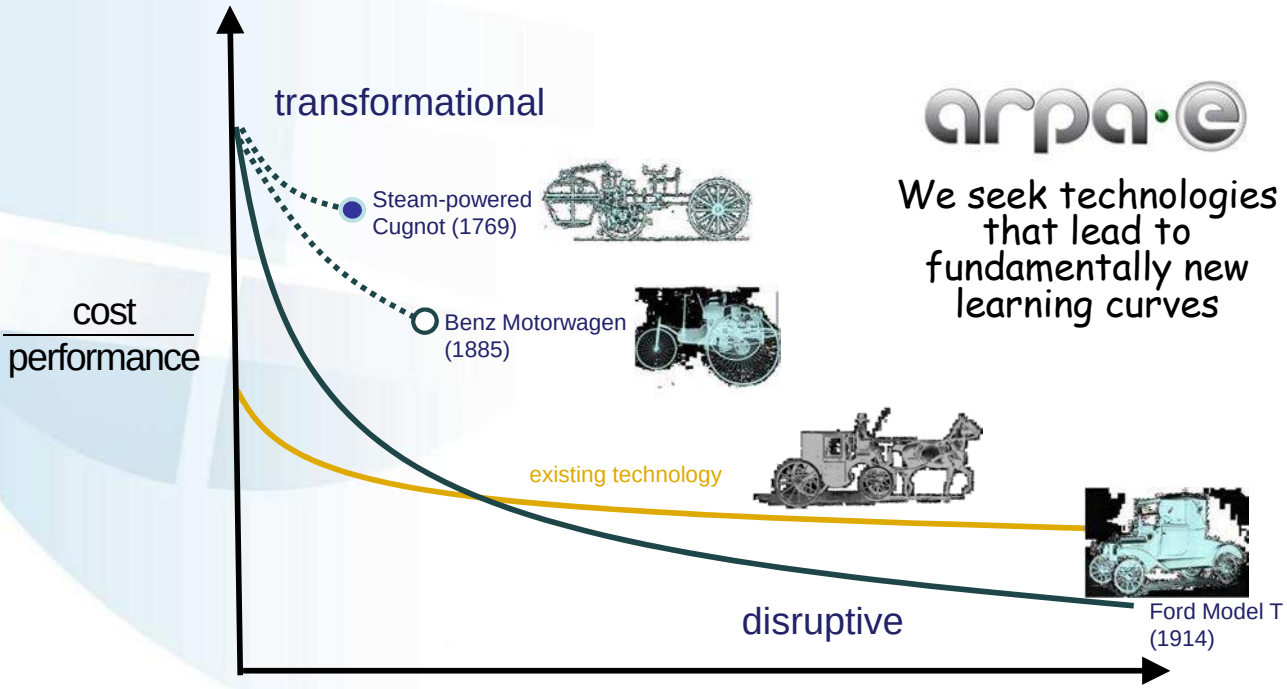




Deep Uncertainties of STI

- Future advances and knowledge (e.g. inventions and innovations) not a function of time, but dependent on intervening actions (science funding & investments)
- Improvements through accumulation of experience (learning + knowledge appreciation)
- Interactive rather than linear process: Learning by doing and using; supply push and demand pull

Incremental & Disruptive Technologies

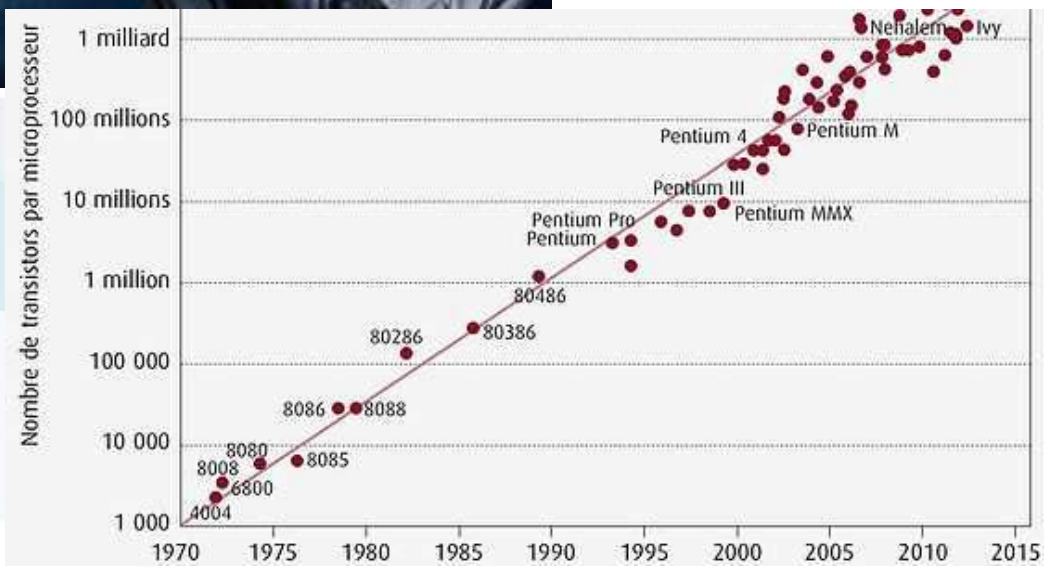


arpa·e

We seek technologies that lead to fundamentally new learning curves

Source: Steve Chu, 2013

More's Semiconductors Law

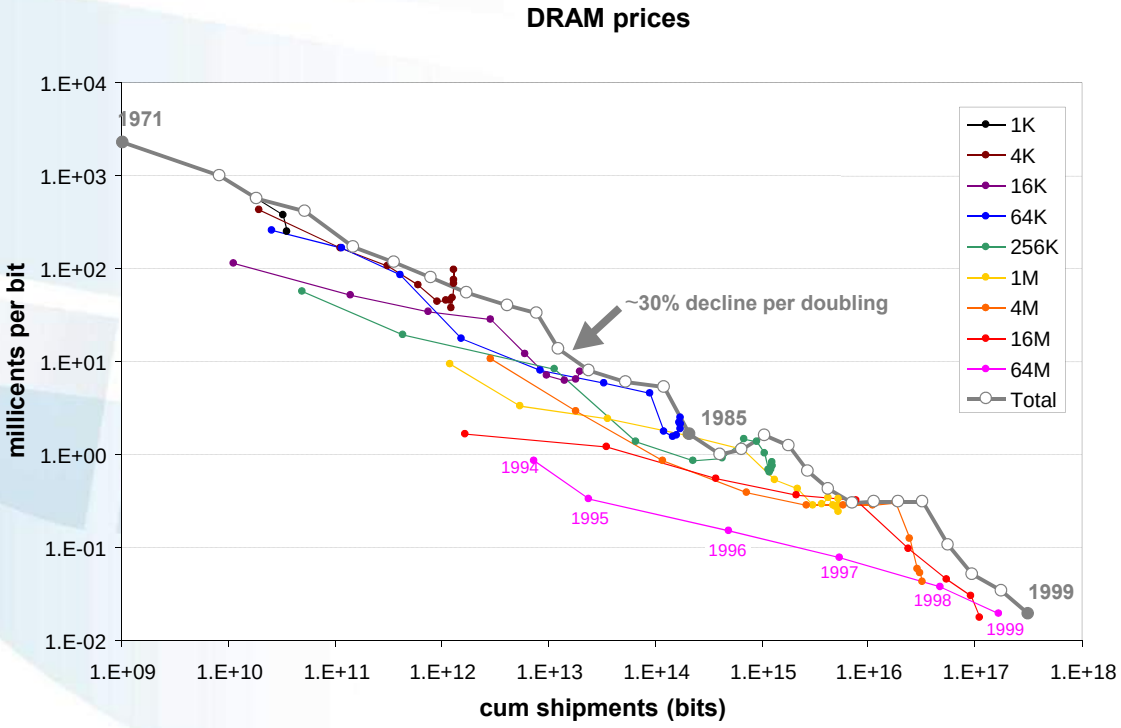


STI Transformational Change

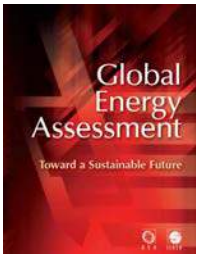
Dynamic, Cumulative, Systemic and Uncertain

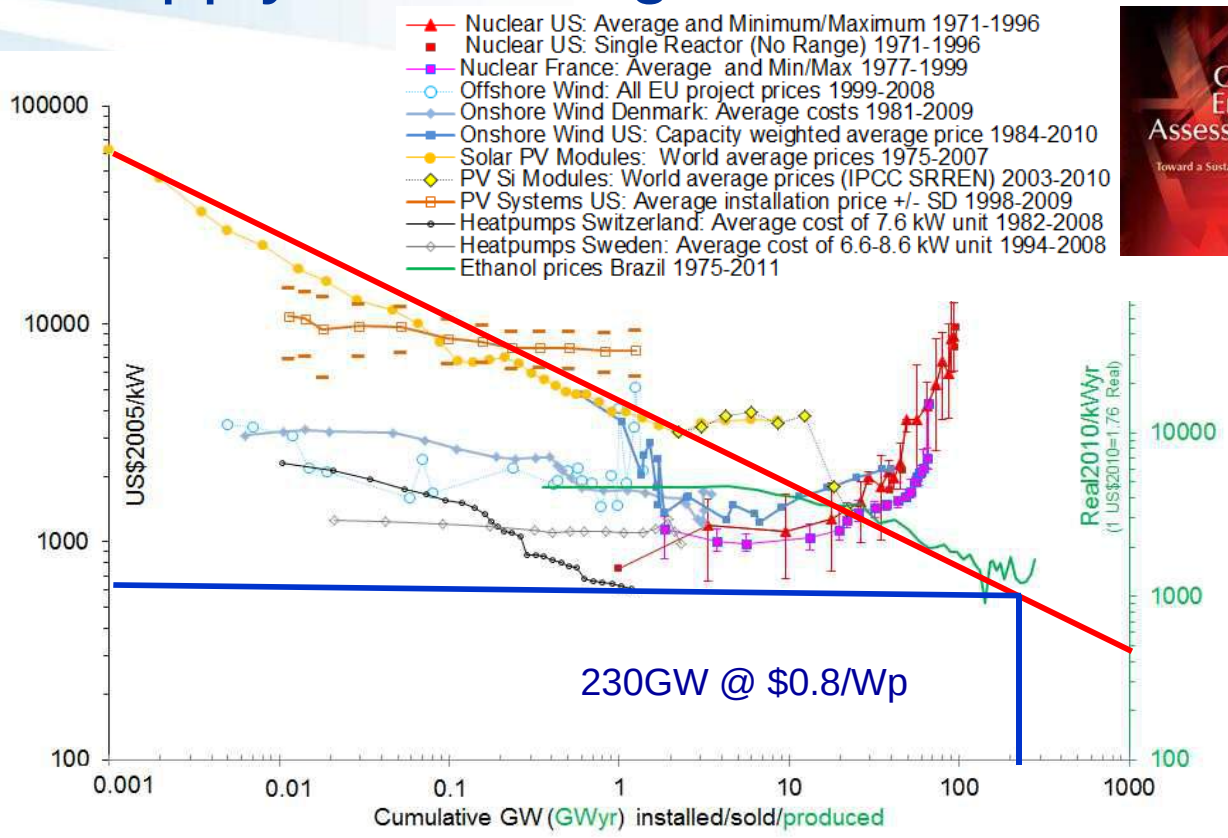
- Incremental – gradual (continuous) and cumulative improvements
- Abrupt – radical, discontinuous and disruptive as “gales of creative destruction”
- Add as many mail-coaches as you please, you will never get a railroad by so doing. [Schumpeter, 1935/1951, 136]

DRAM Prices and Market Growth

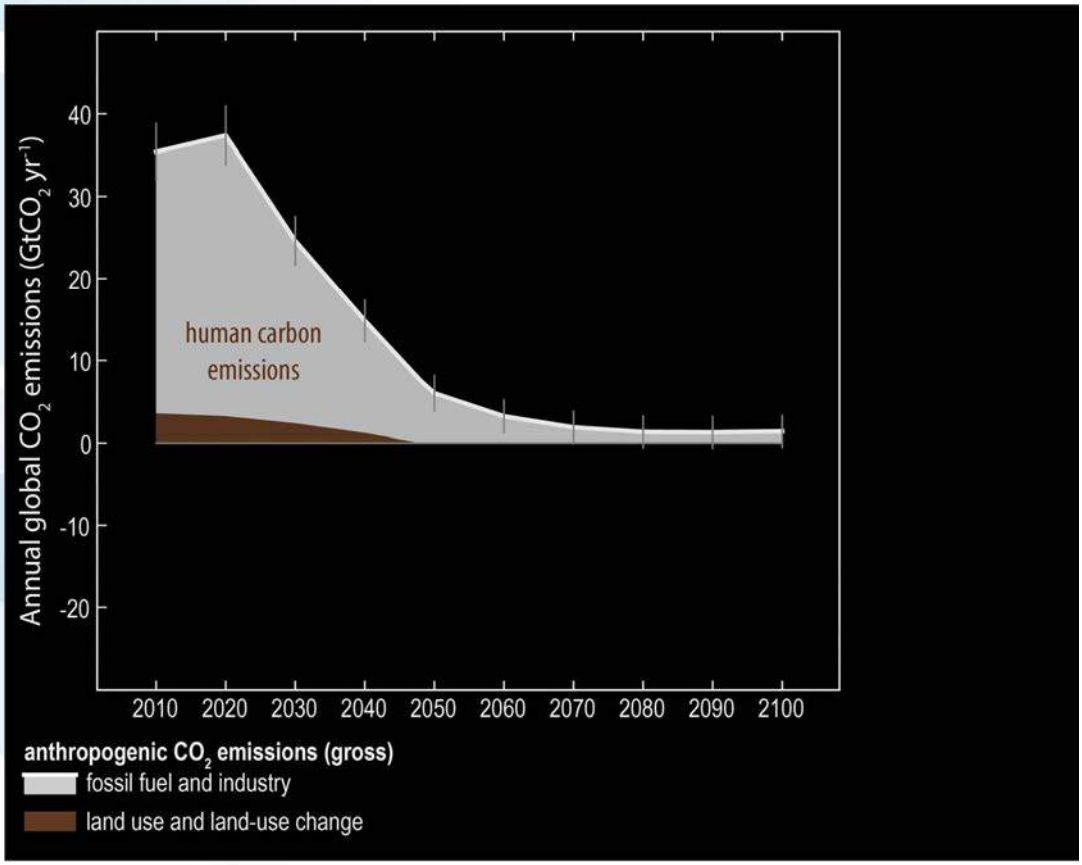


Supply Technologies Cost Trends





More's "Carbon Law"



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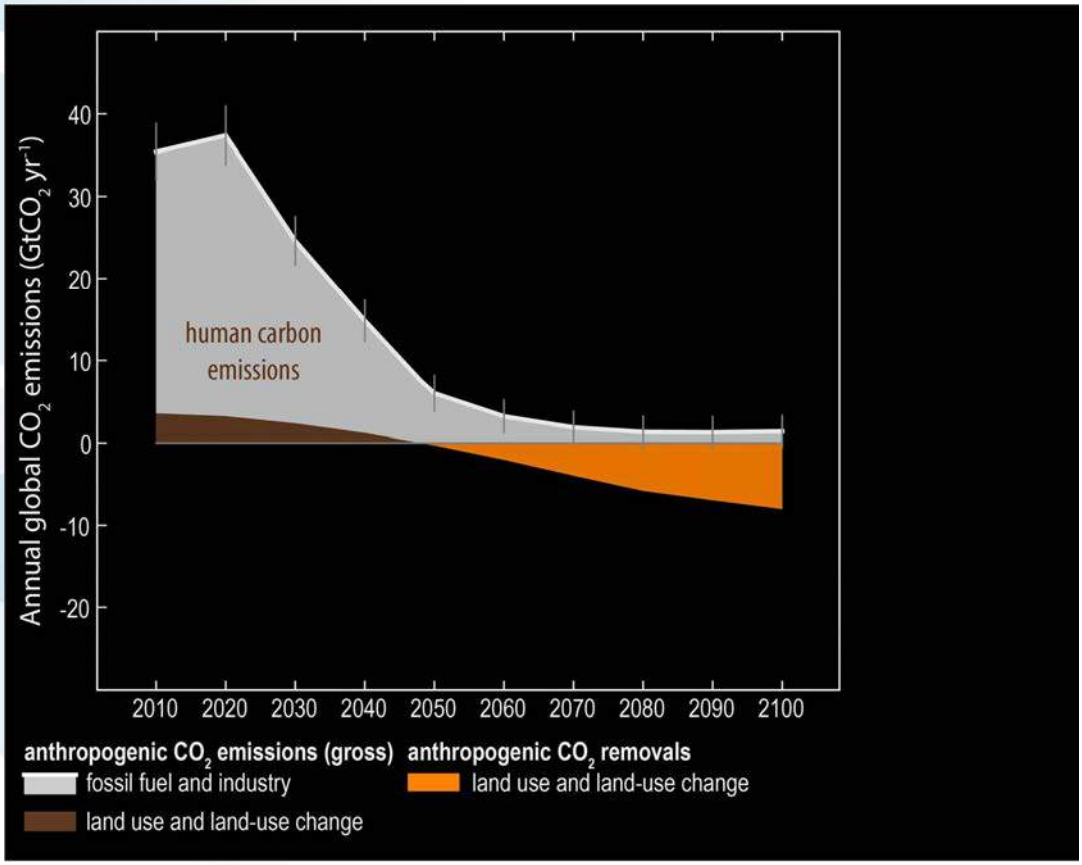

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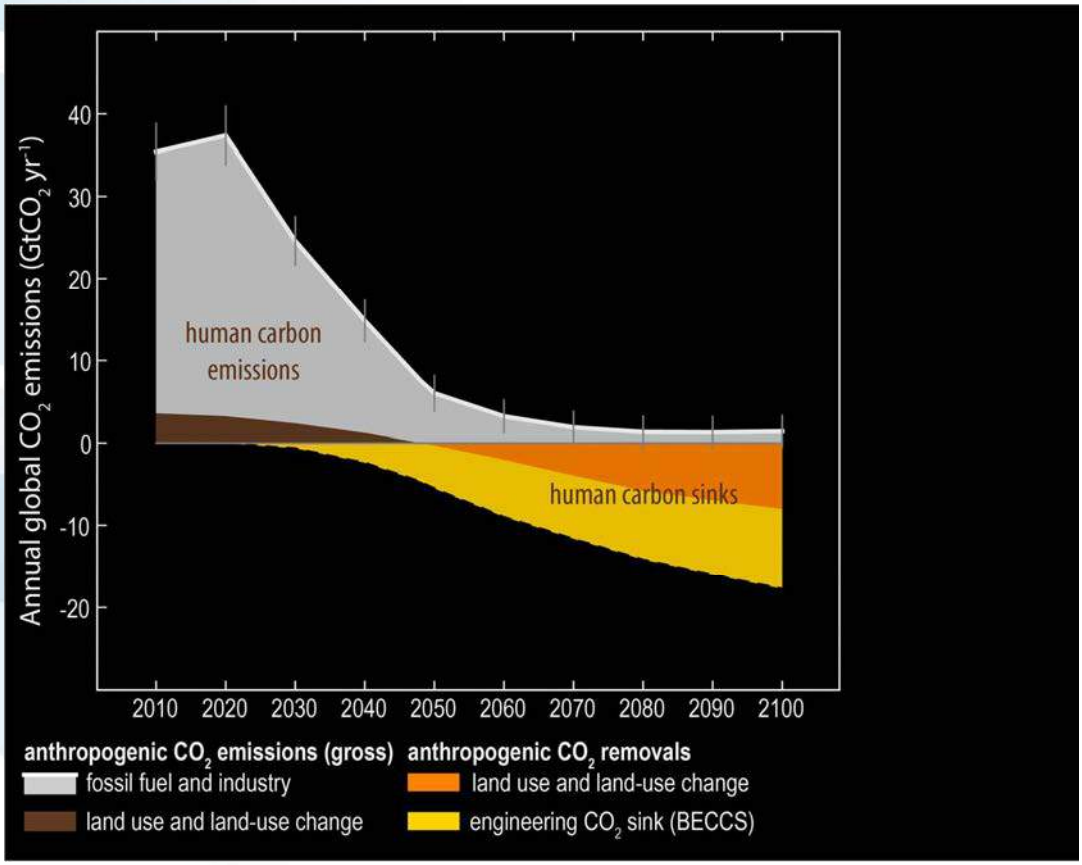

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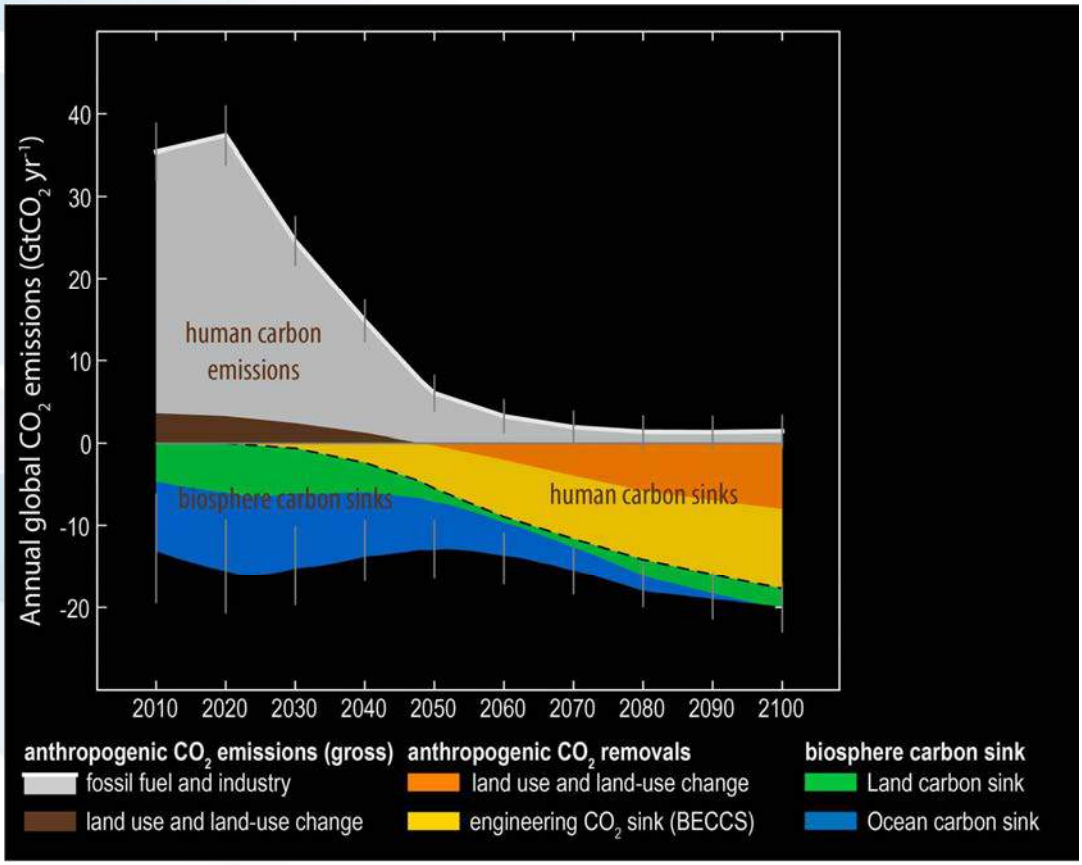
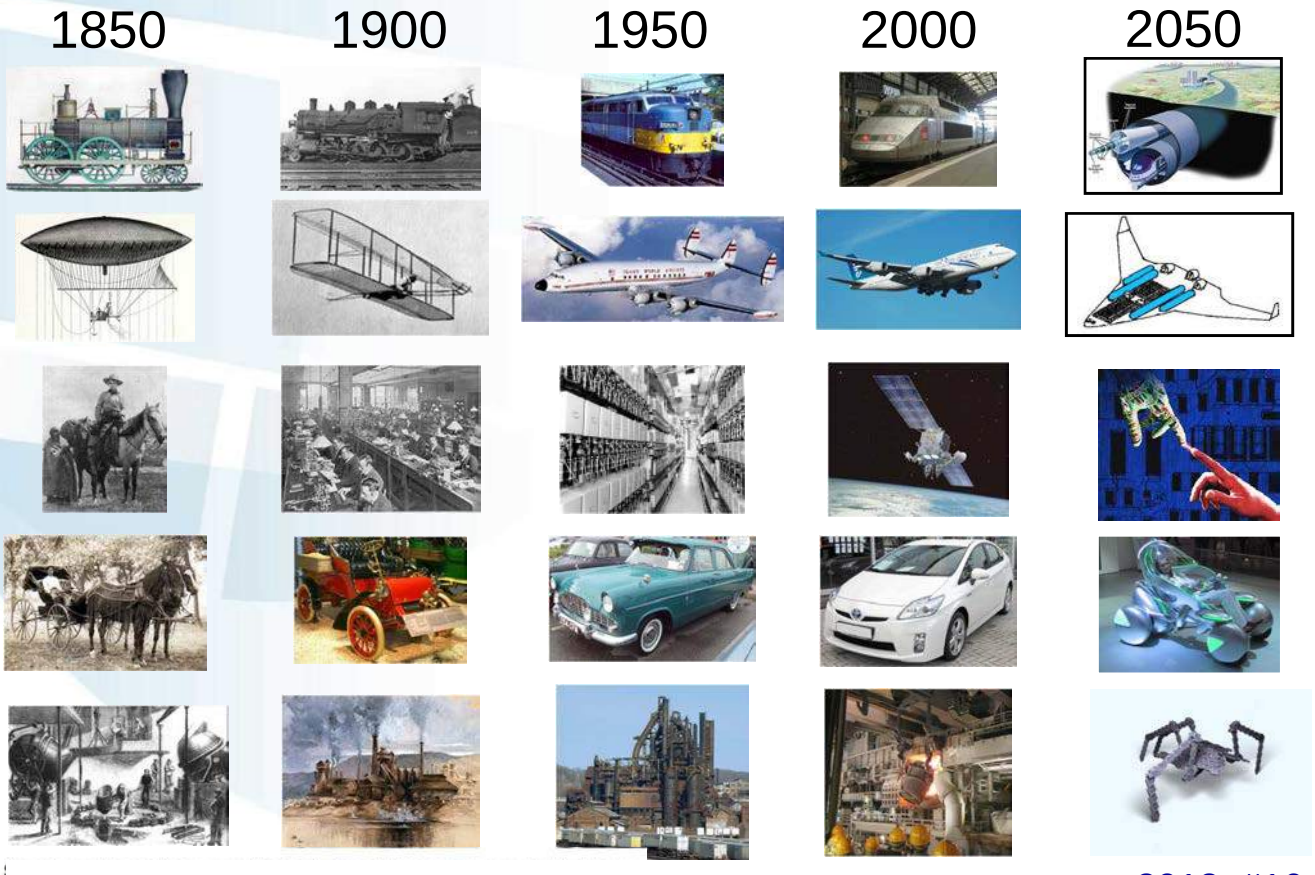


Transformational Change



Source: After Granger Morgan, 2013

TWI2050 Major Transformations

Energy
Decarbonization, efficiency
energy access

Sustainable consumption & production
Resource use, circular economy
sufficiency, pollution

Food & biosphere
Sustainable intensification, ocean biodiversity, forests and water, healthy diets, nutrients

SDGs:
Prosperity
Social inclusion
Sustainability

Digital revolution
Artificial intelligence
big data, biotech, nanotech
autonomous systems

Cities
Housing, mobility
sustainable infrastructure
water, pollution

Human capacities & demography
Education, health, ageing
labor market, gender, inequalities

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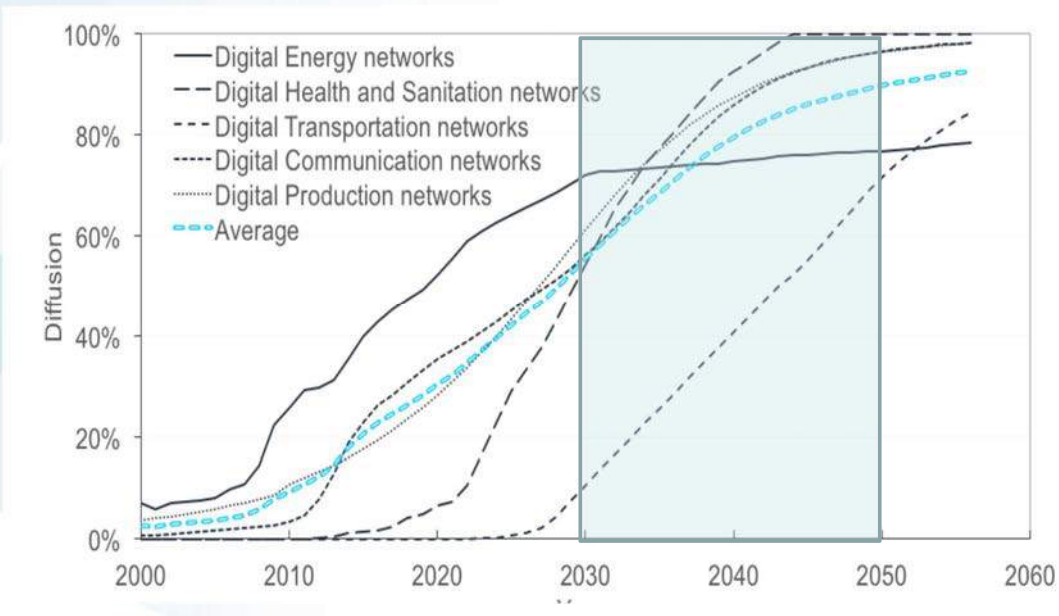
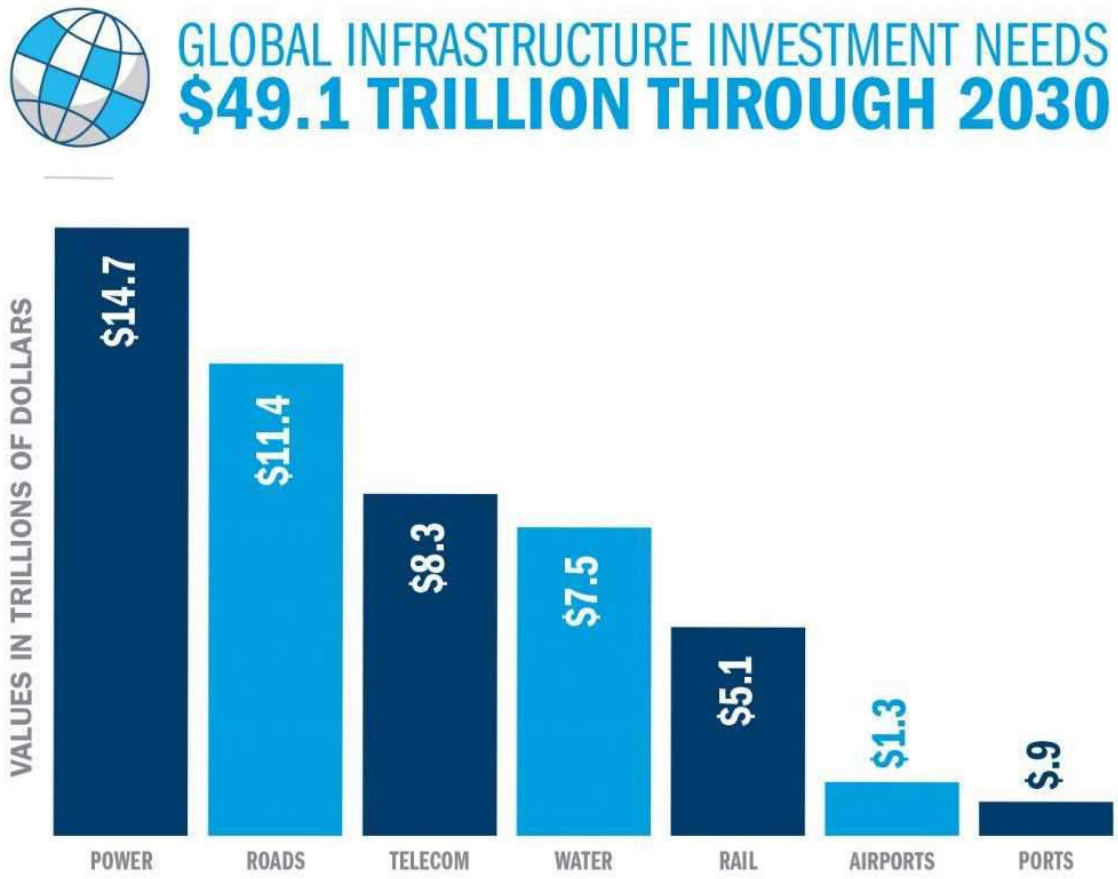
Technology Diffusion Compared
digital revolution



STI Policy Coherence

- **Paradox** of STI:
  - cause of problems, e.g. as negative externalities
  - but solution, if socially and environmentally sound
- Key to
  - Understand inter-relationships, interdependencies and trade-offs
  - Leverage **synergies** among STI policies and SDGs
  - At all levels - global, national, regional and local
- Tools to support policy coherence:
  - integrated assessments
  - systems thinking
  - roadmaps



Source: McKinsey Global Institute, Bridging Global Infrastructure Gaps analysis. Data as of 06/2016.

COLUMBIA THREADNEEDLE INVESTMENTS

TWI2050 Report Outline

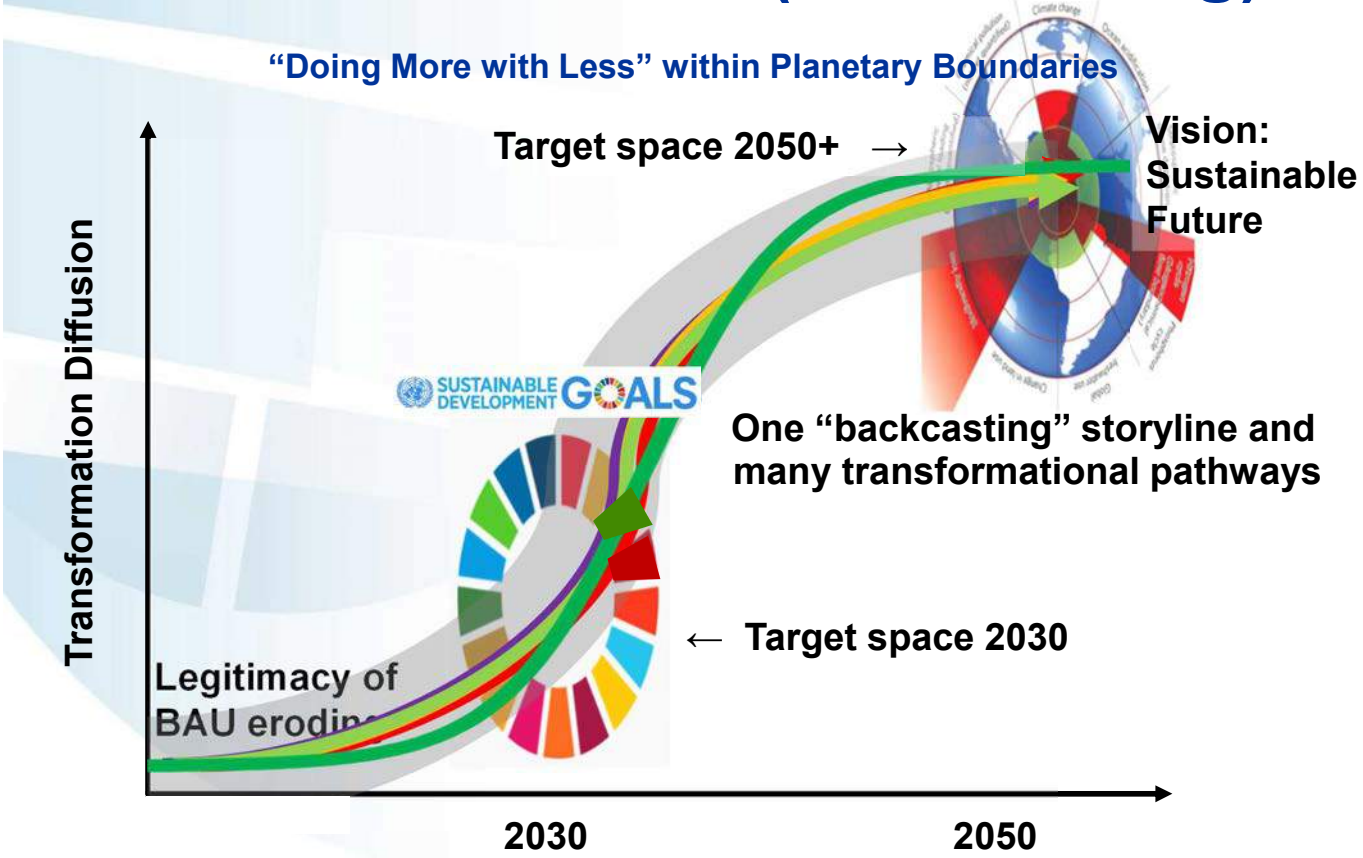
Key Messages

Synthesis

1. Framing and Introduction
2. Mega-transformations
3. Narrative and Overarching Goals
4. Sustainable Development Pathways
5. Governing the Great Transformation

TWI2050 Writing Meeting
5-7 March 2018, IIASA

The World in 2050 (TWI2050.org)



Disruptive Change

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